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(54) **PROTECTIVE HELMET**

(57) Protective helmet, particularly for cyclists or motorcyclists, comprising:
an air inlet (5) formed on a helmet body (2) and adapted to convey air from the external environment towards the inner space of the case,
an air filter (6) arranged at said air inlet,
a ventilation system (10) configured to purify the air in the inner space of the helmet, the ventilation system comprising:
- an air outlet (11) formed on the helmet body (2), and

through which the inner space of the helmet is in fluid communication with the external environment,
- a carbon dioxide sensor (12) configured to provide a signal indicative of the concentration of carbon dioxide in the air in the inner space of the helmet,
- an electric fan (13) arranged at the air outlet (11) and configured to suck the air from the inner space of the helmet and discharge it into the external environment.

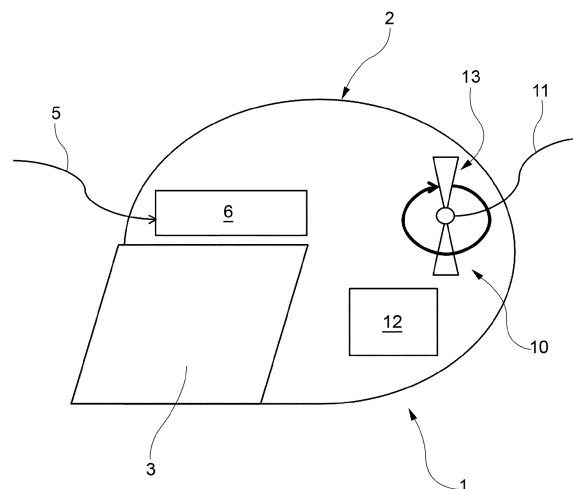


FIG. 1

Description

[0001] The present invention relates to a protective helmet, particularly for cyclists, motorcyclists or the like, comprising

a helmet body forming a protective shell adapted to be worn on the head of a user, and
a face visor mounted on the helmet body and adapted to be placed in front of the face of the user, said face visor being capable of defining, with the helmet body, an inner space adapted to receive the head of the user.

[0002] In cities, emissions from motor vehicles and building heating systems are increasingly significant, leading to a general air pollution problem.

[0003] As a result, more and more people are deciding to travel by bicycle, scooter, or similar means to avoid traffic and parking problems and to avoid further contributing to air pollution.

[0004] Cyclists and the like are therefore faced with a double problem of safety (for example with respect to falls, collisions with vehicles or pedestrians) and pollution (in relation to the poor quality of the air they breathe).

[0005] Regarding safety, to limit the risk of head injury, cyclists and the like generally use protective helmets. Regarding air pollution, the use of face masks to cover the respiratory tract of the user has been proposed. Such masks make it possible to filter the air before it is inhaled by the user and remove some of the pollutants contained therein, such as aerosols, particulate matter, and dust. Combined solutions have also been proposed for prospective helmets equipped with filters and ventilation systems.

[0006] An object of the present invention is to provide a solution for a protective helmet to manage the air quality inside the case.

[0007] In light of this object, the invention provides a protective helmet of the type defined above, further comprising

an air inlet formed on the helmet body and adapted to convey air from the external environment towards said inner space,
an air filter arranged at said air inlet, and
a ventilation system configured to purify the air in said inner space, said ventilation system comprising

- an air outlet formed on the helmet body, and through which said inner space is in fluid communication with the external environment,
- a carbon dioxide sensor configured to provide a signal indicative of the concentration of carbon dioxide in the air in said inner space,
- an electric fan arranged at the air outlet and configured to suck the air from said inner space and discharge it into the external environment, said

electric fan being operable as a function of the signal provided by the carbon dioxide sensor.

[0008] According to the invention, a system is therefore provided for the self-regulation of the ventilation air flow rate inside the helmet according to the need to remove CO₂ from inside the helmet. There are also energy savings for ventilation and a reduction in fan noise, since the ventilation system is triggered only when needed.

[0009] In particular, the ventilation system further comprises a control unit configured to regulate the rotation speed of the electric fan according to the concentration of carbon dioxide.

[0010] Further features and advantages of the protective helmet according to the invention will become clearer from the following detailed description of an embodiment of the invention, made with reference to the accompanying drawings, provided purely by way of non-limiting example, wherein

Fig. 1 is a schematic representation of a protective helmet according to the invention.

[0011] In Fig. 1, a protective helmet is indicated overall by 1. The helmet 1 comprises a helmet body 2 forming a protective shell which is made externally of polymeric material such as PVC or PC and internally of expanded material such as EPS, and is suitable for being positioned on the head of a user to protect at least the upper region, the lateral regions, and the rear region of the head.

[0012] The helmet 1 is adjusted and held in position by conventional means (not shown), comprising an inner framework that allows the helmet 1 to be adapted to the size of the head of the user and a chin strap system that comprises one or more straps or the like.

[0013] The helmet 1 further comprises a face visor 3 mounted on the helmet body 2 and adapted to be positioned in front of the face of the user. The face visor 3 is able to define, with the helmet body 2, an inner space adapted to receive the head of the user. The face visor 3 is transparent and protects the face, particularly the eyes, nose, and mouth of the cyclist against rain, dust, insects, etc. while riding on the vehicle. The face visor 3 is made of a transparent material, such as, for example, a PC-type polymer. The face visor 3 may be hinged to the helmet body 2 to allow the face visor 3 to be rotated between a raised position (not shown) and the lowered position shown in Fig. 1.

[0014] The helmet 1 further comprises an air inlet, represented by the arrow 5 in Fig. 1, which is formed as an opening or duct on the helmet body 2, for example arranged on the front part of the helmet body 2, and is adapted to convey air from the external environment towards the inner space defined between the inside of the helmet body 2 and the face visor 3.

[0015] The helmet 1 further comprises (at least) one air filter 6 arranged at the air inlet 5. The air inlet 5 is therefore in fluid communication with the inner space of the helmet through the air filter 6. This air filter allows at least some pollutants, in particular particulate and/or aer-

osol, to be removed from the air entering the inner space of the helmet, and is, for example, a fine filtration-type filter for breathing air or a HEPA filter.

[0016] The helmet 1 further comprises a ventilation system 10 configured to purify the air in the inner space of the helmet. The ventilation system 10 comprises an air outlet, represented by the arrow 11 in Fig. 1, which is formed as an opening or duct on the helmet body 2, arranged, for example, on the rear part of the helmet body 2. Through the air outlet 11, the inner space of the helmet is in fluid communication with the external environment.

[0017] The ventilation system 10 further comprises a carbon dioxide sensor 12 configured to provide a signal indicative of the concentration of carbon dioxide in the air in the inner space of the helmet. This sensor is a known type of sensor, for example an infrared sensor. As is known, with exhalation, the user expels air relatively rich in carbon dioxide that tends to accumulate in the inner space of the helmet, in particular in the case where the user is performing relatively intense physical activity.

[0018] The ventilation system 10 further comprises an electric fan 13 which comprises a bladed impeller and is arranged at the air outlet 11. The electric fan 13 is configured to suck the air from the inner space of the helmet and discharge it into the external environment through the air outlet 11. A control unit and an electrical power source (not shown) are associated with the electric fan 11, also arranged on board the helmet as are all the components described above.

[0019] The electrical power source comprises a rechargeable battery, and the helmet body 2 comprises a port, such as a USB port, electrically connected to the electrical power source to allow the electrical charging of the battery.

[0020] The electric fan 11 is operable according to the signal provided by the carbon dioxide sensor 12. In particular, the control unit of the electric fan 11 is configured to trigger the rotation of the electric fan 11 when the signal indicative of the concentration of carbon dioxide exceeds a predetermined threshold. Furthermore, the control unit is configured to adjust the rotation speed of the electric fan as a function of the concentration of carbon dioxide. In other words, there is not only an on/off control, but also a modulation of the rotation speed of the electric fan 11, and therefore of the air flow removed from inside the helmet.

[0021] It is understood that the invention is not limited to the embodiments described and shown here, but instead may be subject to modifications relating to the shape and arrangement of parts and design and operating details, according to the numerous possible variants that will appear appropriate to those skilled in the art, and which are to be understood as included within the scope of the invention, as defined by the following claims.

Claims

1. A protective helmet, particularly for cyclists or motorcyclists, comprising

a helmet body (2) forming a protective shell adapted to be worn on the head of a user, a face visor (3) mounted to the helmet body (2) and adapted to be placed in front of the face of the user, said face visor being capable of defining, with the helmet body (2), an inner space adapted to receive the head of the user, an air inlet (5) formed on the helmet body (2) and adapted to convey air from the external environment towards said inner space, an air filter (6) arranged at said air inlet, a ventilation system (10) configured to purify the air in said inner space, said ventilation system comprising

- an air outlet (11) formed on the helmet body (2), and through which said inner space is in fluid communication with the external environment,
- a carbon dioxide sensor (12) configured to provide a signal indicative of the concentration of carbon dioxide in the air in said inner space,
- an electric fan (13) arranged at the air outlet (11) and configured to suck the air from said inner space and discharge it into the external environment, said electric fan being operable as a function of the signal provided by the carbon dioxide sensor (12).

2. The protective helmet according to claim 1, further comprising a control unit configured to trigger rotation of the electric fan (13) when the signal indicative of the concentration of carbon dioxide exceeds a predetermined threshold.
3. The protective helmet according to claim 2, wherein the control unit is further configured to adjust the rotation speed of the electric fan (13) as a function of the concentration of carbon dioxide.

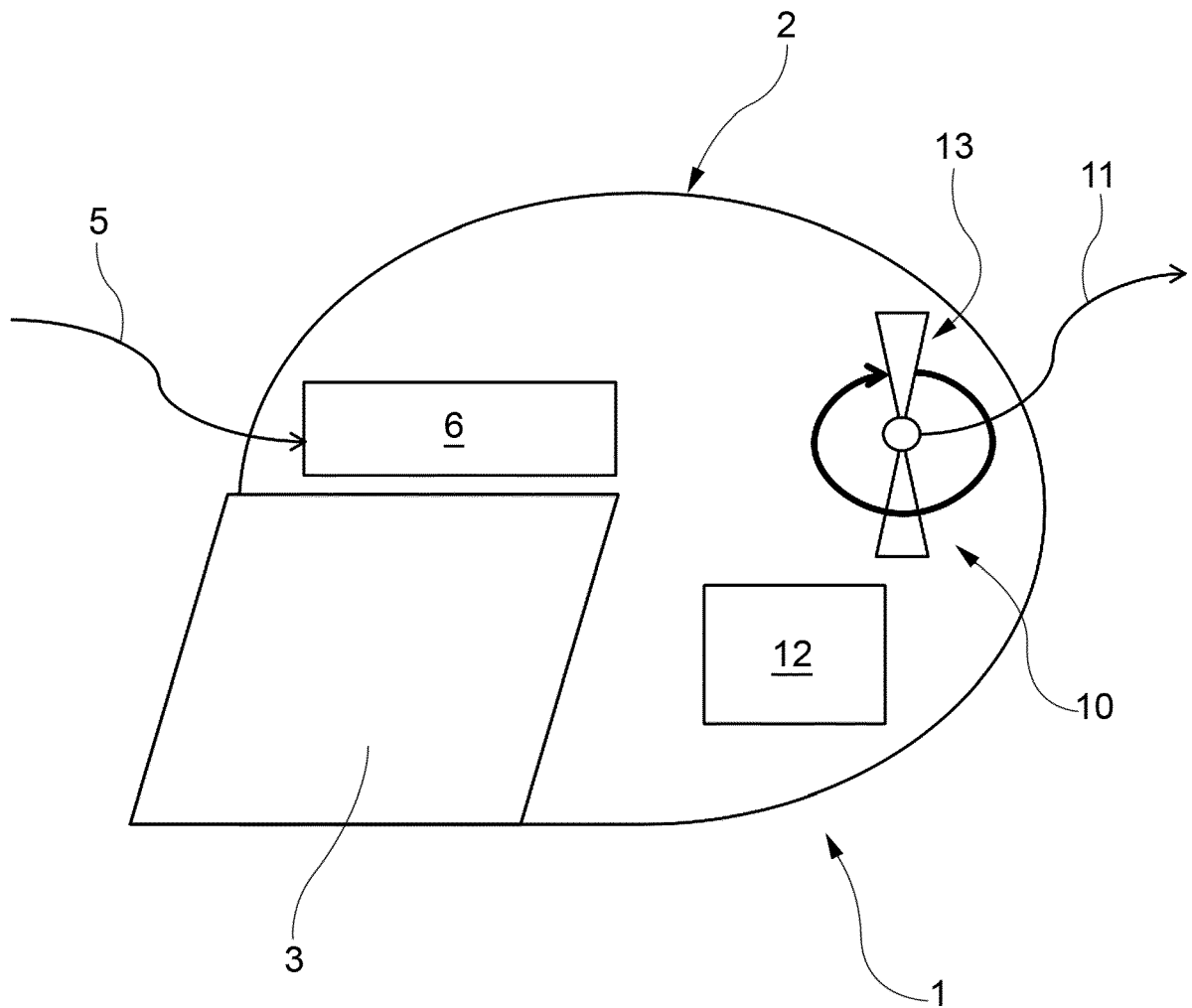


FIG. 1



EUROPEAN SEARCH REPORT

Application Number

EP 23 15 6675

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	CN 105 901 819 A (BEIJING HUACHUANG KUANG'AN TECH CO LTD) 31 August 2016 (2016-08-31) * abstract; figure 1 *	1-3	INV. A42B3/04 A42B3/28
A	US 2021/283432 A1 (MOU HAO-JAN [TW] ET AL) 16 September 2021 (2021-09-16) * paragraphs [0040] - [0046]; figures 1, 4 *	1-3	
A	US 2022/047034 A1 (KRISHNAN SUNDARARAJAN [IN] ET AL) 17 February 2022 (2022-02-17) * paragraph [0022]; figure 1 *	1-3	
			TECHNICAL FIELDS SEARCHED (IPC)
			A42B
The present search report has been drawn up for all claims			

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Place of search	Date of completion of the search	Examiner
The Hague	22 June 2023	D'Souza, Jennifer
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document		

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 23 15 6675

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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22-06-2023

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